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ELDERLY FALL DETECTION MODEL IOT AND DEEP LEARNING

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1.ABSTRACT-

For the elderly, who are losing fitness, Fall detection is a big concern in the public assistance sector. To reduce the impact of falls, prompt and accurate police investigation is essential. Emergency situations will occasionally arise abruptly and out of the blue. The automated fall detection function of a medical alert system will assure you that you may still get the help you need even if you cannot hit the assistance button after a fall.

Adults 65 years of age and older experience increased rates of falling and are often more susceptible to falling. Over the age of 65, one in three people is predicted to experience at least one yearly fall. Adults 65 years of age and older face a serious danger to their freedom and health from falls and injuries related to falls. Falls might result in serious harm or perhaps death. The "long lie," or involuntarily staying on the ground for a further hour or more after falling, causes anxiety about falling to increase. Such an incident may result in serious harm to the person's health and spirits.

2. INTRODUCTION

Fall detection is the biggest difficulty in the public healthcare sector, especially for the elderly due to the deterioration in their physical fitness. to reduce the detrimental impacts of falls, prompt and effective surveillance is required. a fall detection system is an aid with the primary function of warning the user when a fall event has happened. they might be able to lessen some of the negative effects of a fall in the real world.

A. Research Problem

In 2015, more than 9% of the world's population was 65 or older; by 2037 (the period), that percentage is predicted to rise to 20%. The World Health Organisation (WHO) estimates that over 646 000 fatal falls occur each year throughout the world,

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with persons over 65 accounting for the majority of those facilities (WHO, 2018). This places it second behind road traffic injuries in terms of unintentional injury deaths. Falls among the elderly are a significant public health issue worldwide.

B. Research Justification

Wearable technology is placed on a person's wrist as part of the system architecture [5]. The technology uses acceleration analysis to identify elderly people falling. The system will then determine the location of the elderly person and notify carers with a brief fall alert. The elderly who have fallen can therefore receive assistance quickly to lessen the impact.

3. LITERATURE SURVEY

Fig:2.1 Detection of falls from January 2004 to December 2019 across time. Predictive approaches try to foresee fall accidents before or during their occurrence and hence allow prompt responses, such as the activation of airbags. Detection techniques are focused on identifying falls after they occur and raising an alarm to emergency carers. The accuracy of fall detection and prediction systems has been improved over the past few decades, and efforts have also been made to reduce false alarms.

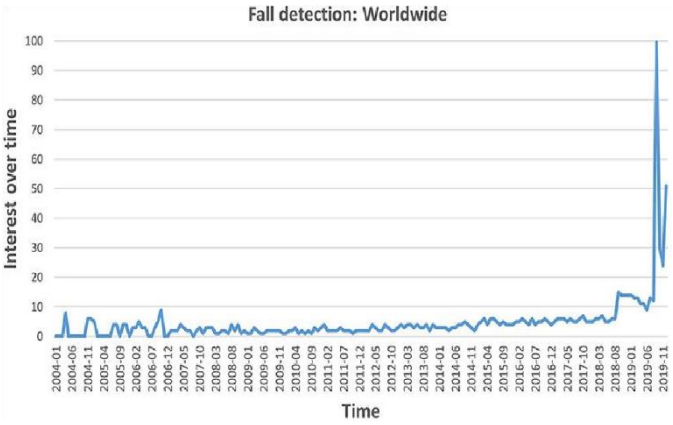

Fig:2.1 Fall detection

4. EXISTING SYSTEM

Another popular technique is one that uses motion sensors. Direct information on linear and angular motion might be obtained via an accelerometer or gyroscope. To identify a genuine fall, sensor readings or their correct fusion might be employed. Different types of motion sensors and detection algorithms are used in different types of detection approaches. Utilizing an accelerometer is the first form of detecting technique.

One triaxial accelerometer can measure an object's acceleration in three directions, including the gravity-affected direction. As soon as the accelerometer is fixed to a human body, a coordinate will be created. The use of a low pass filter or high pass filter makes it possible to detect the effects of gravity or dynamic acceleration. The link between the acceleration component and vector sum may also be used to determine several types of angular movement data. The second type of detecting approach utilizes an accelerometer and gyroscope simultaneously. Gyroscopes may provide information on rotational velocity, and accelerometers can provide data on linear motion. A magnetometer is also used in the third category of detecting technique.

A triaxial magnetometer has the ability to measure angular motion in the horizontal plane as well as magnetic strength in three directions. However, the magnetic environment may interfere with the geomagnetic field, reducing the accuracy of the magnetometer outputs, for instance, around some structures made of steel

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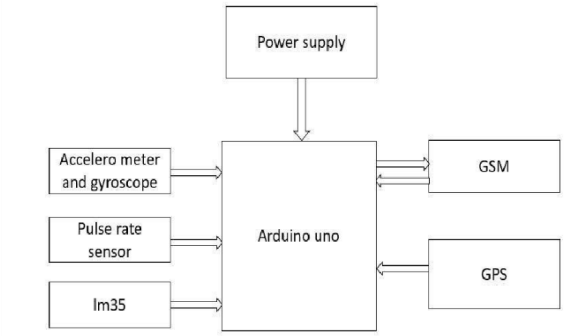
or in close proximity to items with significant electromagnetism.

Disadvantages:

In actuality, utilising more sensors means consuming more power, and it is difficult to create a suitable algorithm to fuse various types of sensors. A single triaxial accelerometer is more than adequate for detecting human falls since its measurements can yield enough data. A further benefit for wearable applications is that the accelerometer coordinate need not be specified if just the sum vector's magnitude is required.

5. PROPOSED SYSTEM

For older patients who are prone to falling, fall detection can improve patient care and provide access to emergency help. We provided a framework for edge computing that uses real-time monitoring from affordable wearable sensors to automatically identify falls. According to our earlier study [3], our LSTM model accurately recognized fall with 99% of the time. We tracked human activity using wireless wearable sensors from Minilab dubbed Meta-motions, which sent real-time data to an edge device. In order to handle the streaming sensor data, we decided to use a laptop as an edge device and create a data analytical pipeline utilizing unique APIs. Studies revealed that our approach has a 95.8% accuracy rate in identifying falls using real-time sensor data.



GYROSCOPE:

A wheel fitted inside two or three gimbals that serve as pivoting supports to enable the wheel to revolve along a single axis makes up a gyroscope. A response force supplied to the output axis causes the wheel to react to a force applied to the input axis. The primary effect applied torque has on the spinning disc's angular momentum vector is why they appear to defy gravity [4]. In turn, this causes the rotational axis as a whole to find a "middle ground" between the pull of gravity and its own angular momentum vector.

ACCELEROMETER:

An electromechanical device used to track acceleration forces is called an accelerometer. These forces might be static, like the constant

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pull of gravity, or dynamic, like in the case of many mobile gadgets, to detect motion or vibrations. The rate of change in velocity, or speed divided by time, is measured as acceleration [5]. The cost-effective, low-power, motion- and tilt-sensing applications of accelerometers include those in mobile devices, gaming systems, disc drive protection, image stabilization, and sports and health equipment. The ADXL335 from Analogue Devices, a compact, low-power triple-axis MEMS accelerometer, serves as the module's brain. The sensor can detect up to +3g in its entirety. In tilt sensing applications, it may measure the static acceleration brought on by gravity as well as the dynamic acceleration brought on by motion, shock, or vibration.

The sensor requires just 350 A of current on average and operates on power between 1.8V and 3.6VDC (3.3V is ideal). However, because it has a built-in 3.3V regulator, it is the ideal choice for connecting to 5V microcontrollers like the Arduino. All of the ADXL335's pins are broken out to a 6-pin, 0.1" pitch header by this breadboard-friendly board. This has three analog outputs for X, Y, and Z axis measurements, two supply pins, and a self-test pin that enables you to evaluate the sensor's functionality in the intended application. The analog outputs are ratio-metric, which means that the Og measurement output is nominally equal to 1.65V, which is half of the 3.3V supply voltage, and that the 3g measurement output is at both Ov and 3.3V with complete scaling in between. here are the complete specifications of ADXL335 Accelerometer IC.

GSM MODULE:

A GSM modem, also known as a GSM module, is a piece of hardware that connects to a distant network using the GSM mobile telephone technology. They are virtually identical to a typical mobile phone from the perspective of the mobile phone network, down to the requirement for a SIM to identify them to the network. The unique Global System for Mobile Communication (GSM) module is made possible by the Short Messaging Service (SMS) for the purpose of monitoring wireless radiation. This module can send text SMS data to a host server after receiving serial data from radiation monitoring equipment like survey meters and area monitors. Using the GSM library, the Arduino GSM shield enables an Arduino board to make voice calls, send and receive SMS, and connect to the internet. The shield is already compatible with the Arduino Uno. With versions of the Arduino IDE greater than 1.0.4 comes the GSM library.

TEMPERATURE SENSOR:

Precision integrated-circuit temperature sensors in the Temperature Sensor LM35 series have an output voltage that is linearly proportional to the temperature in Centi-grade. In comparison to linear temperature sensors calibrated in Kelvin, the LM35 device has an advantage because it does not require the user to deduct a significant constant voltage from the output in order to gain convenient Centigrade scaling. The LM35 device can deliver typical accuracies of +4°C at room temperature and +4°C over the entire temperature range of +55° to +150°C

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without the need for any external calibration or trimming.

PULSE SENSOR:

Pulse Sensor is a great heart-rate sensor for Arduino that is plug-and-play. Students, artists, athletes, makers, game developers, and mobile app developers can all use it to quickly incorporate real-time heart-rate data into their works. Placing a finger on heartbeat sensors causes the heartbeat to be output digitally. The light emitting detector (LED) blinks in sync with each heartbeat as soon as the heart beat detector is operational. Pinout for a pulse sensor connects to an Arduino's analog input. The VCC pin is + (VCC). attached to 3.3 or 5V. Ground pin designation is -(GND). Only 0 to 675 is the range of the Pulse Sensor's output when operating at 3.3V. The Pulse Sensor signal needs to be scaled to fit within the wider predicted range.

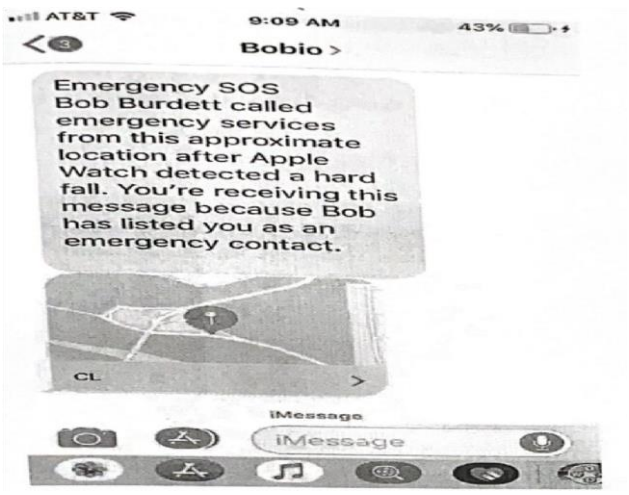
An optical heart rate sensor is built into a smartwatch. It supports keeping an eye on the heart's blood flow. Since your blood travels through your arteries and reflects on your wrist when your heart beats, it estimates your heart-beat per minute.

ARDUINO:

An open-source electronics platform with simple hardware and software is called Arduino. Arduino boards can take inputs like a light on a sensor, a finger on a button, or a tweet and convert them into outputs like turning on a motor, an LED, or publishing anything online [6]. Comparatively speaking, programming an off-the-shelf micro controller is far simpler than using the Arduino hardware, Arduino IDE, and code itself. Because so many people use it, there are a lot of examples available to use with Arduino, which is another factor in its popularity.

An optical heart rate sensor is included with smartwatches. It assists in keeping track of your heart's blood flow. It determines your heart rate based on the fact that your wrist reflects your artery's flow of blood, which is measured in beats per minute.

6. RESULTS



7. CONCLUSION

Fall detection is a challenging technique for which there isn't presently a standardized answer. Fall detectors are crucial for quick help, preventing fall-related anxiety and its negative health effects. Unexpected and sudden emergencies can occur. The

automated fall detection feature of a medical alert system can assure you that you will still get the assistance you require if you cannot touch the help button following a fall or in the event of a medical emergency.

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9. REFERENCES

[1] Panagiotis Kostopoulos, F2D: A location Aware Fall Detection System Tested with Real Data from Daily Life of Elderly People Published online 21 September 2016, Version of Record 21 September 2016.
https://www.sciencedirect.com/science/article/pii/S1877050916321640

[2] Shomir Chaudhuri,Fall Detection Devices and their use Older Adults: A Systematic Review available in PMC 2015 Oct 1.
Published in final edited form as:J Geriatr Phys Ther.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4087103/

[3] **Hengyang Zhao, Development of a Wearable-Sensor-Based Fall Detection System**
https://www.hindawi.com/journals/ijta/2015/576364/

[4] Suzanne C. Ho, Risk Factors for Falls in the Chinese Elderly Population Published: 01 September 1996
https://academic.oup.com/biomedgerontology/article/51A/5/M195/578750

[5] Evaluation of Accelerometer-Based Fall Detection Algorithms on Real-World Falls
https://doi.org/10.1371/journal.pone.0037062

[6] Research of fall detection and alarm applications for the elderly,Proceedings 2013 International Conference on Mechatronic Sciences, Electric Engineering and Computer
https://ieeexplore.ieee.org/document/6885137

[7] Elderly Fall Detection Systems: A literature Survey Front. Robot. AI, 23 June 2020
https://www.frontiersin.org/articles/10.3389/frobt.2020.00071/ful